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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* ZVI YANIV and  
RICHARD FINK

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Appeal 2009-0744  
Application 10/765,623  
Technology Center 2800

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Decided:<sup>1</sup> March 17, 2009

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Before CATHERINE Q. TIMM, LINDA M. GAUDETTE, and  
JEFFREY B. ROBERTSON, *Administrative Patent Judges*.

ROBERTSON, *Administrative Patent Judge*.

DECISION ON APPEAL

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<sup>1</sup> The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, begins to run from the Decided Date shown on this page of the decision. The time period does not run from the Mail Date (paper delivery) or Notification Date (electronic delivery).

## STATEMENT OF THE CASE

Appellants appeal under 35 U.S.C. § 134(a) from the Examiner’s rejection of claims 1-9, 11, and 12.<sup>2</sup> (Examiner’s Answer entered February 25, 2008, hereinafter “Ans.”). We have jurisdiction pursuant to 35 U.S.C. § 6(b).

We AFFIRM.

## THE INVENTION

Appellants describe an apparatus including a substrate having holes embossed therein and carbon nanotubes deposited in the embossed holes. Appellants also describe a data processing system, which includes a substrate having embossed holes and carbon nanotubes deposited in the embossed holes. (Spec. 3, ll. 14-26; 5, ll. 8-24; Fig. 5).

Claims 1 and 7, reproduced below, are representative of the subject matter on appeal.

1. An apparatus comprising:

a substrate with holes embossed therein with a die; and  
carbon nanotubes deposited in the empty embossed holes.

7. A data processing system comprising:

a processor;  
a memory device;  
a storage device;

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<sup>2</sup> Claims 10 and 13-18 have been canceled. (Appeal Brief filed November 28, 2007, hereinafter “Br.,” 1).

an input device;  
a display device; and  
a bus system for coupling the processor to the memory device, the storage device, the input device, and the display device, wherein the display device further comprises:  
a substrate with holes embossed therein with a die; and  
carbon nanotubes deposited in the empty embossed holes.

### THE REJECTIONS

The prior art relied upon by the Examiner in rejecting the claims on appeal is:

Park	US 6,019,656	Feb. 1, 2000
Nakamoto	US 6,097,138	Aug. 1, 2000
Yaniv	US 6,312,303 B1	Nov. 6, 2001 (Jul. 19, 1999)
Imai	US 6,653,366 B1	Nov. 25, 2003 (Jan. 10, 2000)

The grounds of rejection to be reviewed on appeal are:

- (1) The Examiner rejected claim 1 under 35 U.S.C. § 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as being unpatentable over Park;
- (2) The Examiner rejected claim 1 under 35 U.S.C. § 102(e) as being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as being unpatentable over Imai;
- (3) The Examiner rejected claims 1-6 under 35 U.S.C. § 102(e) as being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as being unpatentable over Nakamoto; and

(4) The Examiner rejected claims 7-9, 11, and 12 under 35 U.S.C. § 103(a) as being unpatentable over Yaniv in view of Nakamoto.

The Examiner found that Park, Imai, and Nakamoto each disclose an apparatus comprising a substrate with holes and carbon nanotubes deposited therein. (Ans. 4-6). The Examiner found that the appealed claims are directed to an apparatus, and Park, Imai, and Nakamoto disclose substrates with holes that meet the structural limitations implied by the claim recitations “embossed therein with a die” and “embossed holes.” (Ans. 4-6).

The Examiner found that Yaniv discloses the recited data processing system of claim 7 except for a substrate with holes and carbon nanotubes deposited therein. (Ans. 7). The Examiner determined that it would have been obvious to incorporate Nakamoto’s device in the data processing system of Yaniv in order to provide a display device with increased high density nanotubes per unit area and obtain excellent luminous efficacy. (Ans. 8).

Appellants contend that the Examiner admits that “embossed holes” are not disclosed in the prior art. (Br. 5). Appellants further contend that the difference between holes formed by the prior art etching process and holes formed by an embossing process as claimed is significant because “mechanical embossing can be practiced on a wider range of substrate materials and allows more flexibility and precision in the geometry of the hole and the pitch of the pattern.” (Br. 5 and 7). Appellants also argue that Imai discloses that the carbon nanotubes are pulverized into carbon powder, which further distinguishes the present claims. (Br. 7).

## ISSUE

Have Appellants shown that the Examiner reversibly erred in determining that Park, Imai, and Nakamoto disclose or suggest devices having the same structure as Appellants' claimed holes embossed in a substrate having carbon nanotubes deposited therein?

We answer this question in the negative.

## FINDINGS OF FACT

The record supports the following findings of fact (FF) by a preponderance of the evidence.

1. Park describes a substrate with micro-sized holes, where the holes are formed by an etching process, and where carbon nanotubes fill the holes vertically. (Col. 2, ll. 11-27; Figs. 1a and 1b).
2. Imai describes a substrate with concave portions that are filled with a carbon ink, where the carbon ink includes carbon nanotubes. (Col. 10, ll. 24-40; col. 12, l. 64 – col. 13, l. 3; Fig. 3a).
3. Imai discloses that the concave portions are formed in a predetermined pattern, and that the pattern is formed by lithography. (Col. 1, l. 66–col. 2, l. 1; col. 12, ll. 64-66).
4. Imai states:

If the carbon nanotubes are pulverized and used for the carbon particles 1 of the carbon ink of the present invention, not only is their electron emission efficiency high because of their rod-like longish molecule shape, but since they adhere to the substrate 4 to which they are applied more effectively in an upright orientation, the electric field can be concentrated better at the tip of the carbon nanotubes, which display the best known electron emission properties, so that an even higher efficiency can be expected.

(Col. 10, ll. 32-40).

5. Nakamoto describes a substrate having recesses formed by lithography, where carbon nanotubes are deposited in the recesses. (Col. 11, ll. 5-20; Figs. 8B, 8C).

#### PRINCIPLES OF LAW

[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.

*In re Thorpe*, 777 F.2d 695, 697 (Fed. Cir. 1985) (internal citations omitted).

“Where a product-by-process claim is rejected over a prior art product that appears to be identical, although produced by a different process, the burden is upon the applicants to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product.” *In re Marosi*, 710 F.2d 799, 803 (Fed. Cir. 1983).

#### ANALYSIS

We confine our discussion to appealed claim 1, which contains claim limitations representative of the arguments made by Appellants pursuant to 37 C.F.R. § 41.37(c)(1)(vii).

We agree with the Examiner that Appellants have failed to demonstrate any structural characteristics that differentiate the recited apparatus from the apparatus disclosed in each of Park, Imai, and Nakamoto.

(Ans. 10, 11, 13). Although Appellants argue that embossed holes are produced by mechanical alteration using heat and pressure while the etching processes of the prior art are based on chemical reactions, the appealed claims are directed to the product produced by embossing the substrate with a die and depositing carbon nanotubes therein, not the process of producing the substrates. Similarly, Appellants' argument that the recited embossing method allows for more flexibility and precision in the geometry of the hole and the pitch of the pattern and can be practiced on a wider range of substrate materials does not distinguish the appealed claims from the prior art structures. The appealed claims do not recite any particular substrates or any particular level or precision or geometry of the holes. Therefore, Appellants have not established a difference between the substrates with holes recited in the claims and the substrates with holes disclosed in Park, Imai, or Nakamoto.

Appellants have failed to demonstrate that Imai's apparatus does not contain carbon nanotubes. First, Imai does not require the carbon nanotubes to be pulverized as argued by Appellants. In the portion of Imai relied on by Appellants, Imai states that pulverizing the carbon nanotubes is optional. (*See* FF 4). Second, if the carbon nanotubes are pulverized, Imai does not state that the nanotubes are destroyed, but in fact relies on the "rod-like longish molecular shape" to provide high electron emission efficiency. (*See* FF 4; Ans. 12). Therefore, Appellants have not established that the carbon nanotubes claimed are different than the carbon nanotubes disclosed in Imai.

Because we affirm the Examiner's rejections of the claims under 35 U.S.C. § 102 as anticipated by Park, Imai, and Nakamoto, we also affirm the Examiner's alternative rejections under 35 U.S.C. § 103. *See In re*

*Fracalossi*, 681 F.2d 792, 794 (CCPA 1982)(“lack of novelty is the ultimate of obviousness”).

Turning to the fourth ground of rejection, Appellants do not refute the Examiner’s findings with respect to Yaniv. (Br. 8 and 9) Rather, Appellants argue that the Examiner failed to establish a *prima facie* case of obviousness because Nakamoto does not disclose or suggest the claimed display device. For the reasons discussed above, Appellants’ arguments fail to persuade us of reversible error in the Examiner’s rejection of claims 7-9, 11, and 12 as unpatentable over Yaniv in view of Nakamoto. Therefore, we likewise sustain this rejection.

## CONCLUSION

Appellants have failed to demonstrate that the Examiner reversibly erred in determining that Park, Imai, and Nakamoto disclose or suggest devices having the same structure as Appellants’ claimed holes embossed in a substrate having carbon nanotubes deposited therein.

## ORDER

We affirm the Examiner’s decision rejecting claim 1 under 35 U.S.C. § 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as being unpatentable over Park.

We affirm the Examiner’s decision rejecting claim 1 under 35 U.S.C. § 102(e) as being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as being unpatentable over Imai.

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We affirm the Examiner's decision rejecting claims 1-6 under 35 U.S.C. § 102(e) as being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as being unpatentable over Nakamoto.

We affirm the Examiner's decision rejecting claims 7-9, 11, and 12 under 35 U.S.C. § 103(a) as being unpatentable over Yaniv in view of Nakamoto.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(v).

AFFIRMED

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